EX PARTE OR LATE FILED ORIGINAL

CROWELL & MORING
1001 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, D.C. 20004-2595
(202) 624-2500
CABLE: CROMOR
FACSIMILE (RAPICOM): 202-628-5116
W. U. I. (INTERNATIONAL) 64344
W. U. (DOMESTIC) 89-2448

SUITE 1200
2010 MAIN STREET
IRVINE, CALIFORNIA 92714-7217
(714) 263-8400
FACSIMILE (714) 263-8414

DENNING HOUSE
50 CHANCERY LANE
LONDON WC2A 1ED
44-71-413-0011
FACSIMILE 44-71-413-0333

March 30, 1994

BY HAND DELIVERY

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W. Room 222
Washington, DC 20554

RE: ET Docket No. 92-28
CC Docket No. 92-166

EX PARTE PRESENTATION

Dear Mr. Caton:

On March 29, 1994, Jay Ramasastry, Chuck Windett, Dale Gallimore and William Wallace representing Loral Qualcomm Satellite Services, Inc. met with Cecily Holiday, Thomas Tyzc, Fern Jarmulnek, Harold Ng and Julie Garcia of the Common Carrier Bureau to discuss potential MSS feeder link bands below 15 GHz as summarized in the enclosure.

Two copies of this letter and enclosure are submitted for each docket referenced above.

Respectfully submitted,

Will Wallace

William D. Wallace

Enclosure

cc: (w/out enclosure)
Cecily Holiday
Thomas Tycz
Fern Jarmulnek
Harold Ng
Julie Garcia

Globalstar

LQSS Presentation
to
Federal Communications Commission

Common Carrier Bureau

C-Band Feederlink Selections

March 29, 1994

MSS C-Band Feederlink Objectives

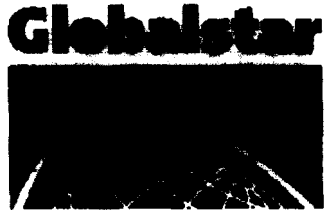
- C-Band
- 200 MHz Uplink and 200 MHz Downlink with at least 100 MHz separation
- Sharing with Fixed Satellite Service
- Sharing with Terrestrial Usage
- Worldwide Availability
- Many small gateway stations co-located with PSTN Interconnections

Frequency Choices

- **C-Band**
  - Low propagation loss
  - Small gateways
  - Much use by terrestrial
  - Sharing with FSS required
  - More effective spectrum usage (Polarization reuse)

- **K-Band**
  - High propagation loss, forces site diversity
  - Multiple tracking antennas on satellite forces few gateways
  - Increasing use by both satellite and terrestrial users
  - Sharing with FSS required
  - More bandwidth required (no polarization reuse at Ka-Band)

Prospects C - Band

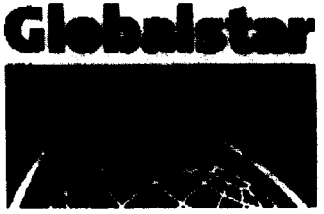


- **Sharing with C-Band FSS proved workable by Reverse-band Working (RBW)**
  - CEPT SG18 Report
  - INMARSAT/UK/France Telecom
  - WP 4A Output documents
  - TG 4/5 Input documents

- **Sharing with C-Band Terrestrial proved workable**
  - Latker simulation
  - Comsearch mainbeam coupling analysis
  - CEPT SG18 Report

- **System design can provide sharing flexibility due to beam traffic usage variation**

Prospects Ka-Band



- **Sharing of several system feederlinks has not been demonstrated**
- **MSS sharing with LMDS and FSS has not been demonstrated**
  - COMSAT Report vs. MSS NRM Report have opposite conclusion
- **New MSS user link applications**
  - (Teledesic, etc.) will make Ka-band feederlinks nearly impossible
  - Rain depolarization decreases sharing, increases bandwidth requirement
  - Reverse band working may not be practical

C-Band Feederlink

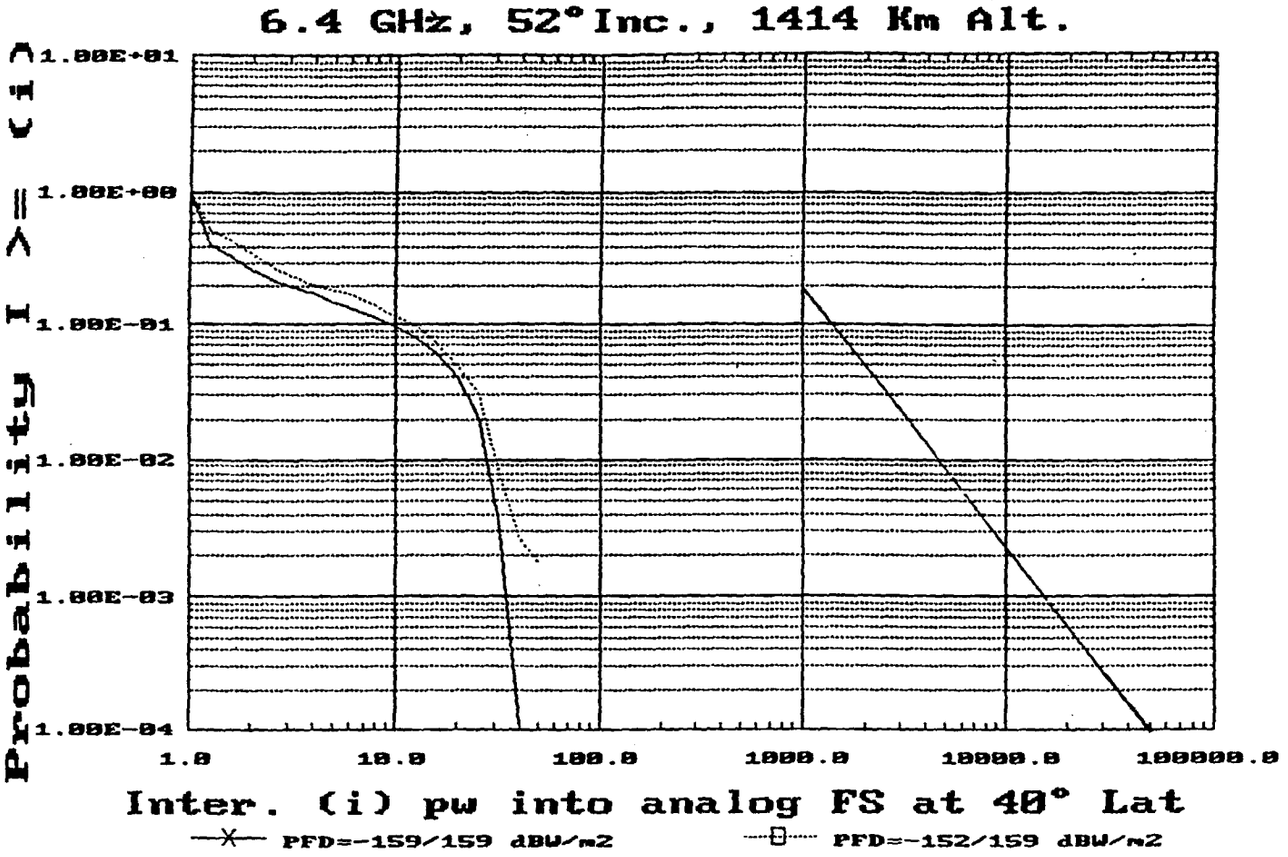
Downlink into Terrestrial Results

- 10 to 20 db of margin exists with respect to the specification derived from a 25 pW0p level

- MSS systems (e.g. Globalstar) can operate at PFD levels from 6 dB to 15 dB lower than those used in the analysis

Globalstar

Non-Geo, 48 Satellite Network



C-Band Feederlink
Downlink Analysis #2

Comsearch Analysis

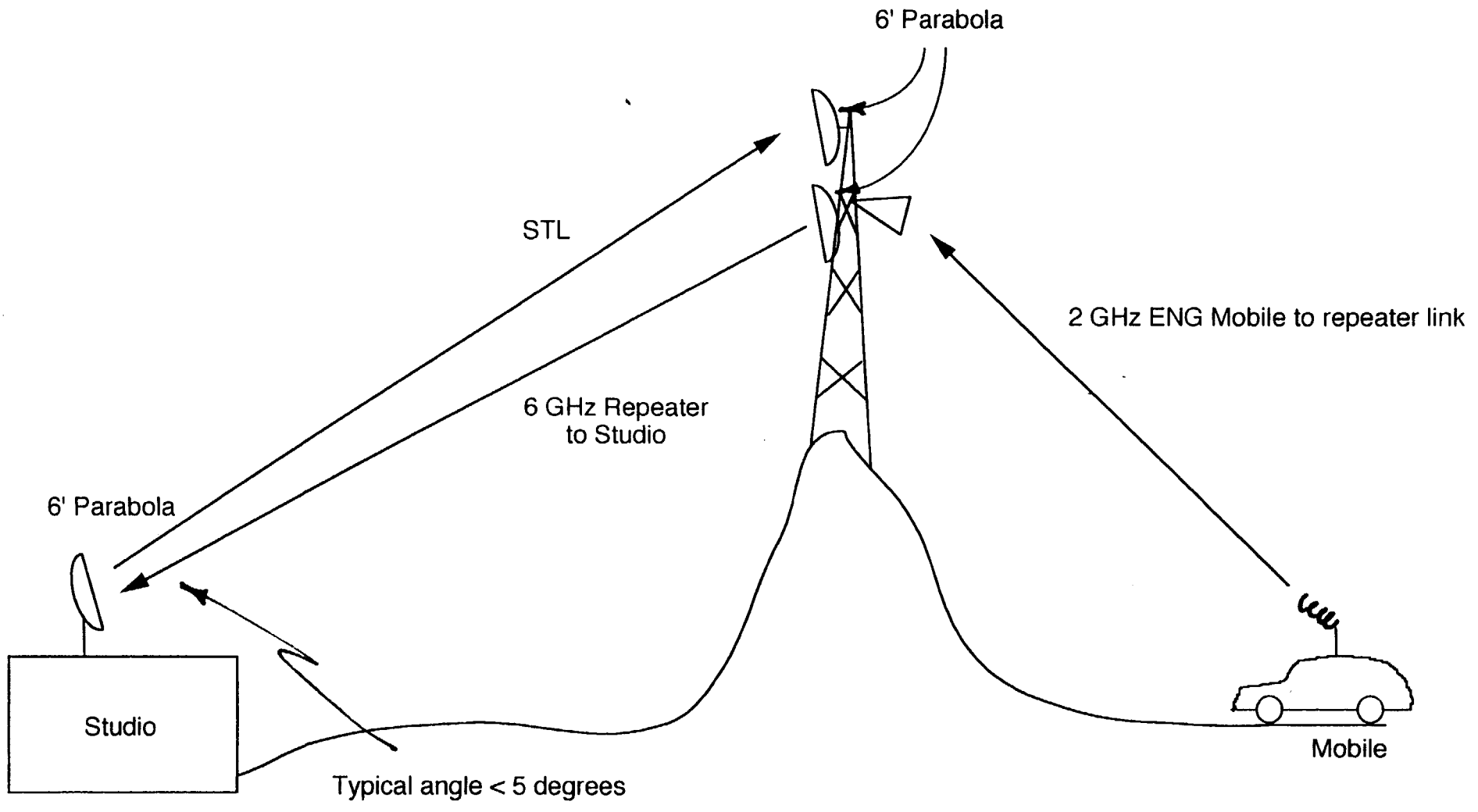
- Considered direct main beam coupling of a MSS satellite into a fixed microwave installation

- Calculated typical C/I values achieved and compared them to co-channel C/I requirements

C-Band Feederlink
Downlink Analysis #2

- **Used Comsearch databases for Chicago, Washington DC, and Columbus, Ohio**
- **5925 - 6425 MHz common carrier pt-to-pt typical services:**
  - 20 - 30 MHz mix of FM video, WB digital, FDM/FM
- **6425 - 6525 MHz temporary fixed pt-to-pt restoration for services in 6525 to 6875 MHz band**
- **6525 - 6875 of pt-to-pt microwave typical services:**
  - 400 KHz - 10 MHz, FDM/FM, digital
- **6875 - 7125 MHz auxiliary broadcast typical services:**
  - Studio transmitter links (pt-to-pt) ENG repeater to studio link
  - 10 x 25 MHz video channels
  - Point-to-point installations
  - 6' parabola antennas

Auxiliary Broadcast Scenario



C-Band Downlink Feederlink Analysis #2 Results

Globalstar

C/I Requirements		C/I Achieved
Op Fixed FDM/FM	66-74 dB	• 73 dB plus, for OFS in 281 out of 284 cases; Remaining cases meet C/I specification for system
Op Fixed Digital	68-78 dB	
• Op Fixed and Aux Video	65 dB assumed (conservative)	• 65 dB plus, for AuxiliaryBroadcast in 37 out of 41 cases
		Probability that fixed multipath fade margin is required precisely at the time a satellite is lined up with main beam coupling is near zero

C-Band Downlink PFD Values

Elevation (deg)	PFD (dBW/m²/4 kHz)
0	-173.5
5	-171.5
10	-169.5
15	-168.5
20	-166.5
25	-165.5
30	-164.5
40	-164.5
50	-164.5
60	-164.5
70	-164.5
80	-164.5
90	-164.5

(The above PFD levels have over a 3 dB margin for uneven loading. They occur only during peak loading hours after several years operation when full capacity is reached.)

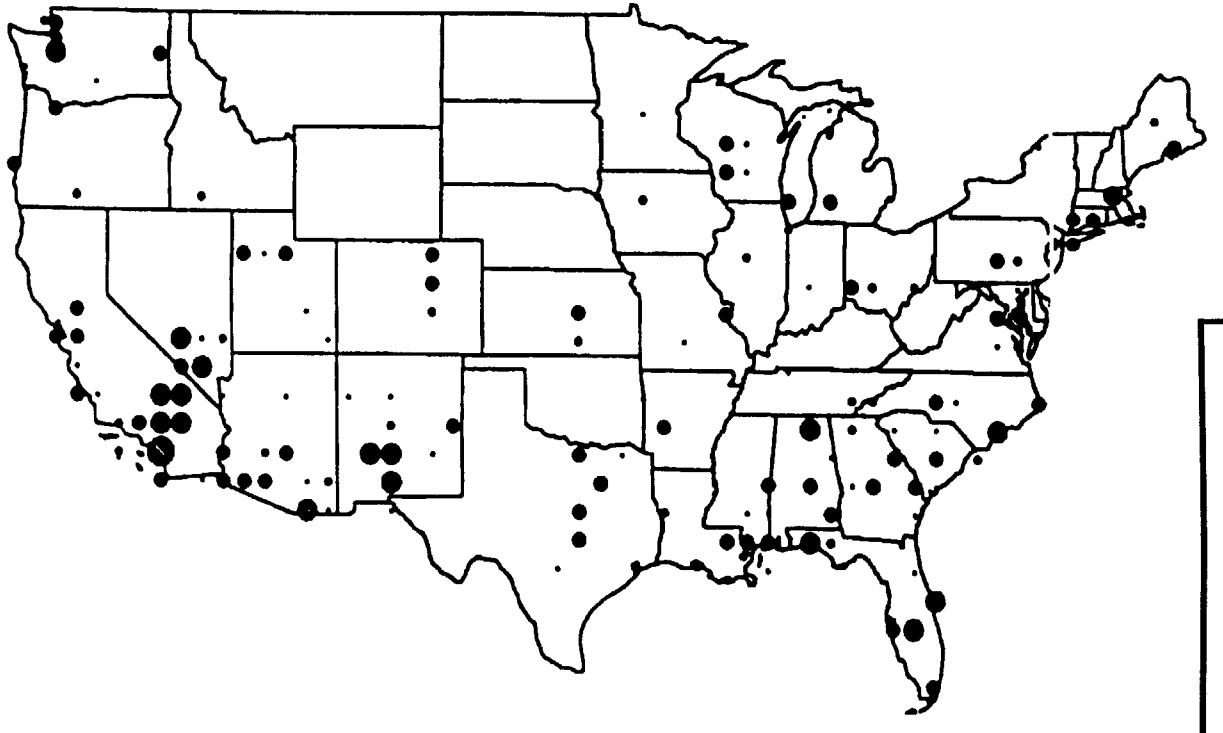
C-Band Uplink Feederlink Analysis

- **Coordination with Terrestrial**
  - Site location with respect to fixed terrestrial
    - » CEPT SG 18 Report indicates limited coordination required
    - » Gateways may be located in remote areas with easy coordination
- **Coordination with FSS**
  - RBW proposed in all cases for downlink
  - RBW proposed in FSS planned allocation band for uplink

Usage in the 4400-4990 MHz Band (Government Services)

Globalstar

- NTIA Report May, 1993 ITS staff study titled,
"A Priliminary Look at Spectrum Requirements For the Fixed Service"



4400-4990 MHZ
Transmitters per 1 Degree Block

- 1
- 2 to 3
- 4 to 11
- 12 to 39
- 40 or More

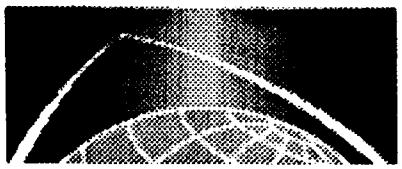
4600-4800 MHz Band for MSS Uplink

- Government has co-primary allocations for fixed and mobile
- Military uses include dual-purpose line-of-sight/troposcatter links for tactical communications
- These are point-to-point systems with sufficient power (greater than 1 KW) to allow troposcatter operations
- In addition, band is used in drone control, target scoring, and balloon-to-ground systems
- Average bandwidth of fixed systems is 8 MHz

4600-4800 MHz Uplink Band (Continued)

(Usage indicated for 4400-4990 MHz Band)

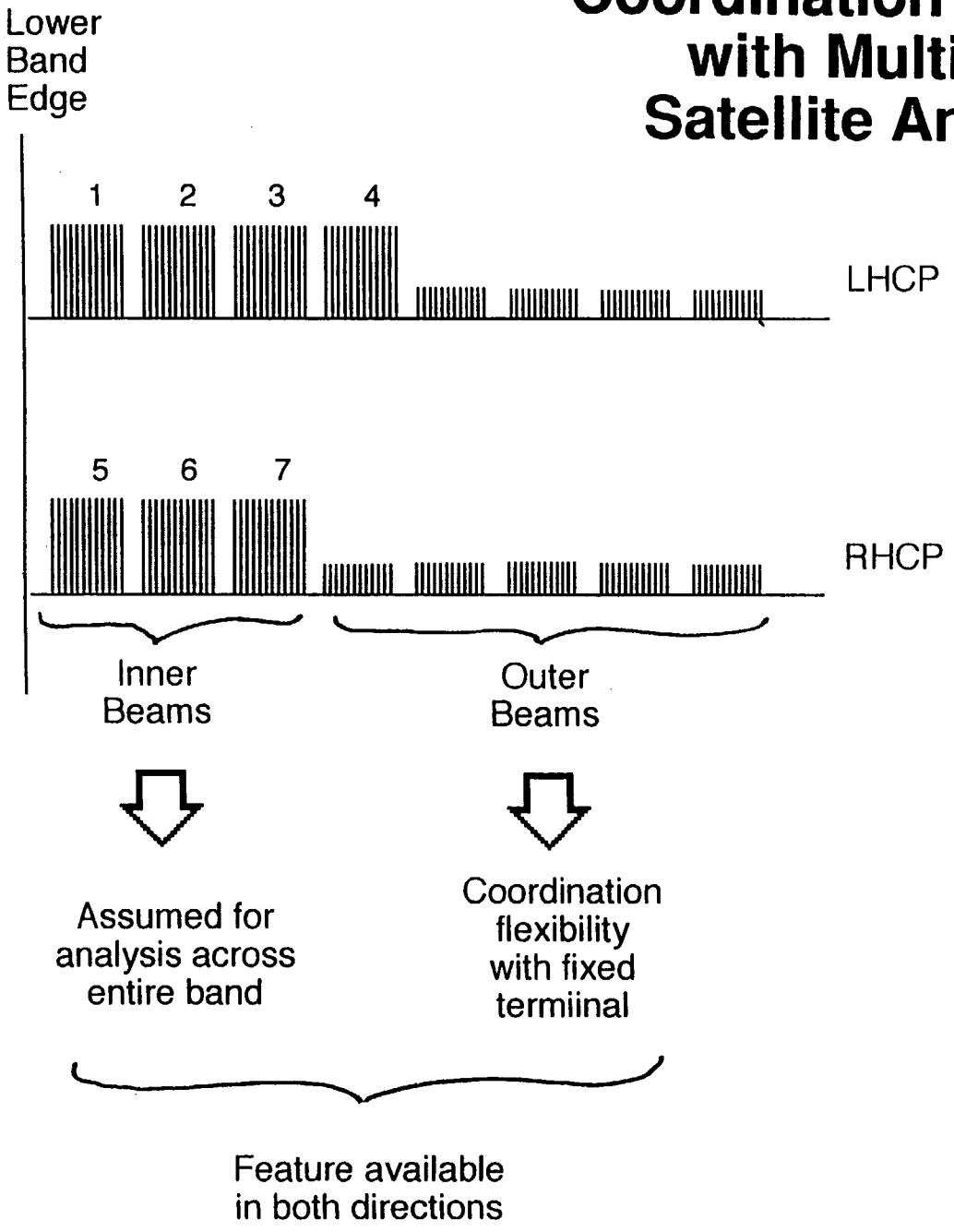
- Air Force has 886 assignments for training, remoting of tactical radar and miscellaneous activities
- Army has 437 assignments for training, mobile data links, and for test range uses
- Navy has 298 assignments for tactical training, links to RPVS, and for test evaluation
- As of June 1992, there were 1,738 total assignments of which 896 were fixed; 75% of the listed fixed terminals are transportable
- Growth is one per cent per year

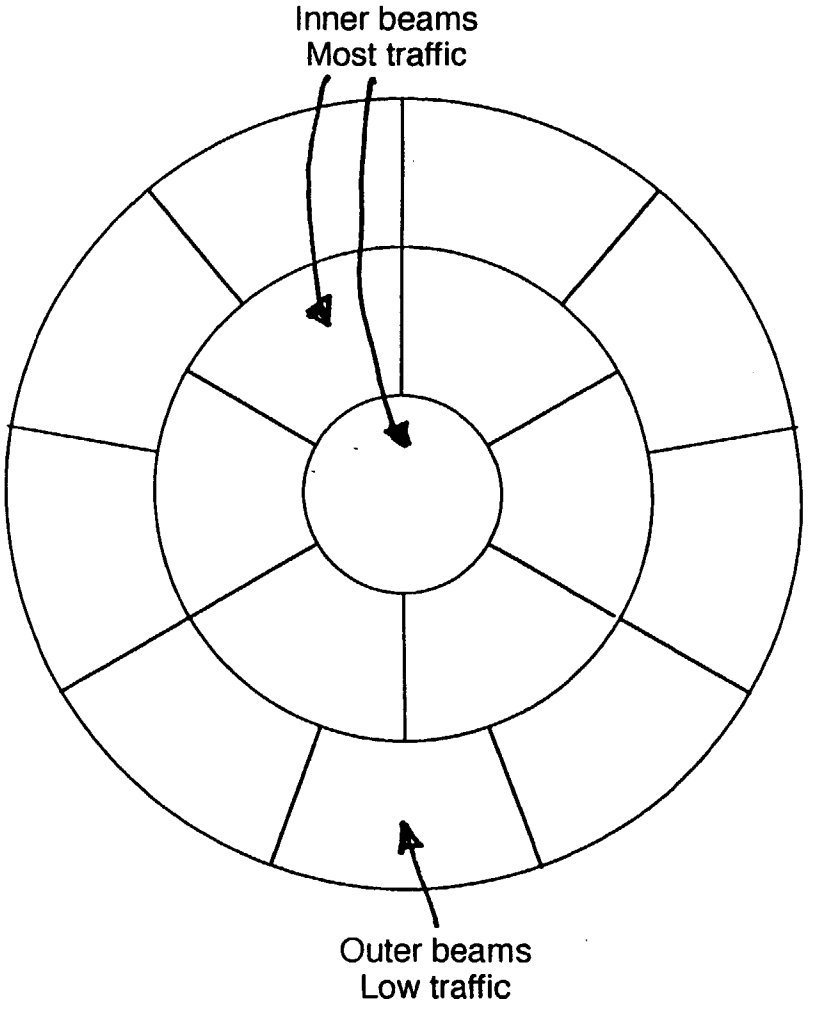


Feasibility of NGSO/MSS Uplinks in the 4600-4800 MHz Band

- Few U.S. gateways are necessary and are easy to coordinate
- Uplink sites can be chosen to alleviate interference situations; if necessary, shielding can be implementd to further improve sharing
- C/I values are similar to those calculated for private microwave; OFS stations can be easily protected

Coordination Flexibility with Multibeam Satellite Antennas





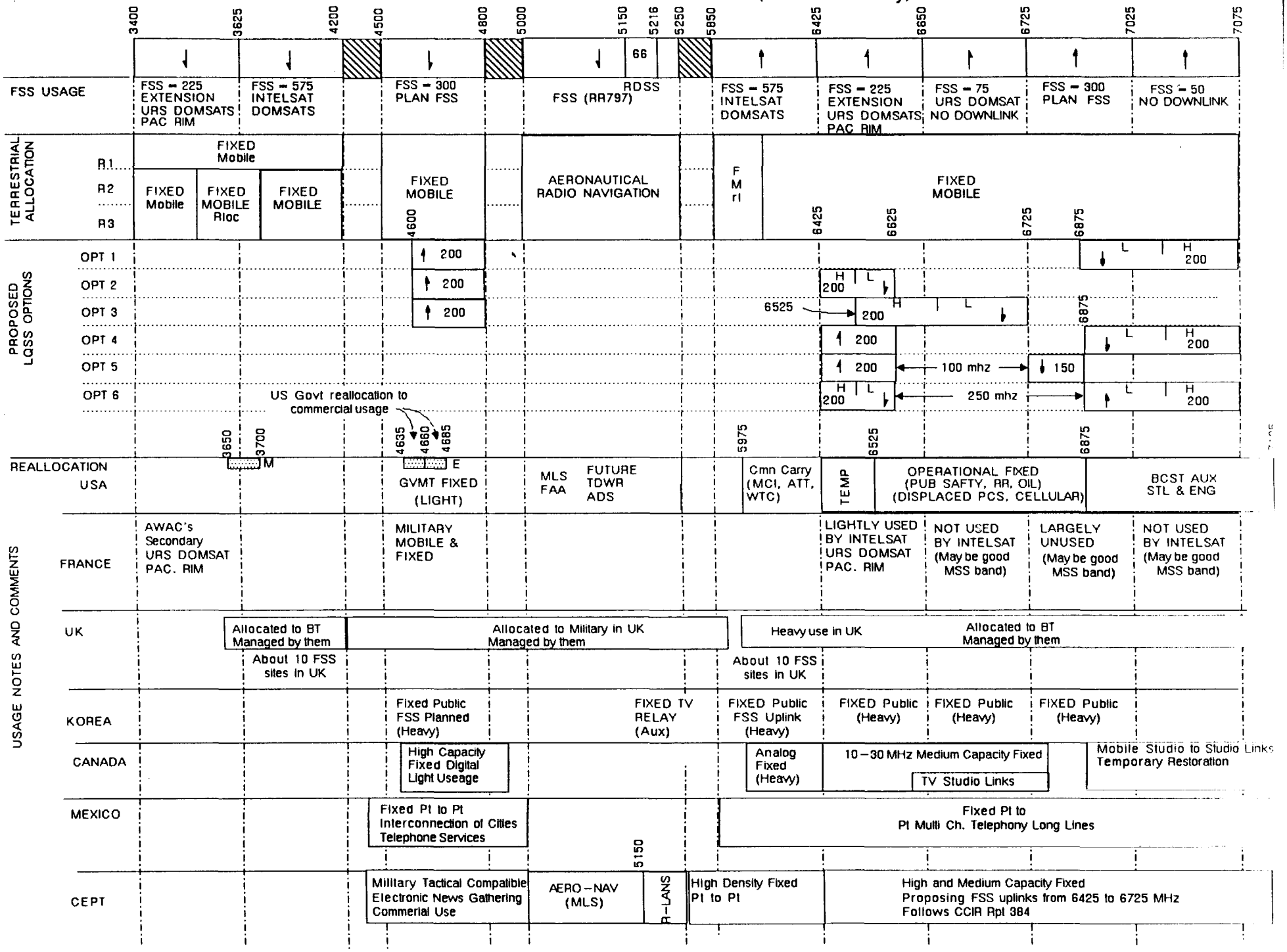
GSO/FSS & NGSO/MSS Feederlink Sharing

Studies conducted indicate the following:

- **Feederlinks are operated in reverse-band mode, requirements of RR 2613 are easily met by operating feeder E/S antennas above 10 deg elevation; no special features are required in S/C**

- **Satellite-to-satellite interference not a problem**

CURRENT USAGE OF C-BAND (Results of Survey)

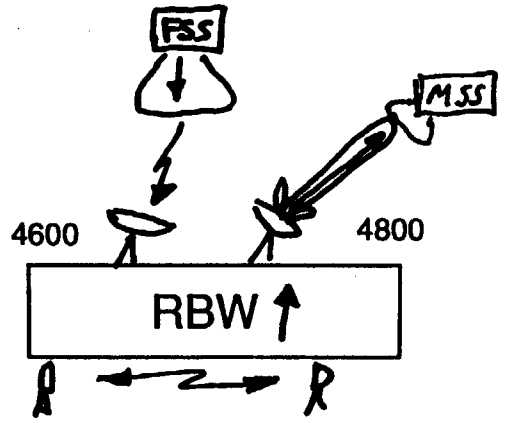
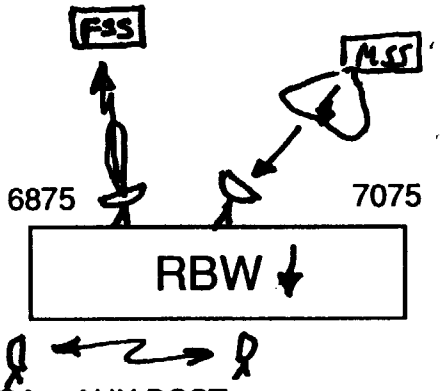
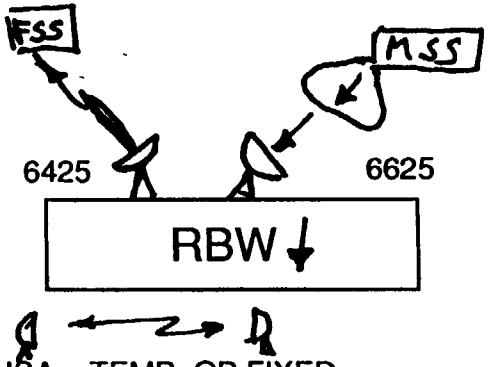


PROPOSED C-BAND OPTIONS

IN FSS ALLOCATION BANDS

CENTRAL ISSUES

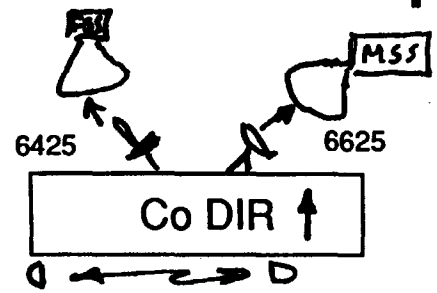
- DOWNLINK INTERFERENCE INTO AUX BCST/FIXED
  - Calculations show acceptable values
  - No FSS coordination
- UPLINK GOORDINATION WITH GOVERNMENT SERVICES
  - Lightly used
  - Site location Flexibility
  - No FSS Coordination

	UPLINKS	CENTRAL ISSUES	DOWNLINKS
1	 USA = GOVT(50 MHZ REALLOCATION) CAN = PT - PT FIXED MEX = PT - PT FIXED CEPT = MIXED USAGE KOREA = PT - PT FIXED		 USA = AUX BCST CAN = AUX BCST MEX = PT - PT FIXED CEPT = PT - PT FIXED KOREA = PT - PT FIXED
2	SAME AS ABOVE	• DOWNLINK INTERFERENCE INTO FIXED – Calculations show acceptable values – Unknown temporary usage • UPLINK COORDINATION WITH GOVERNMENT SERVICES – Lightly used – Site location Flexibility – No FSS Coordination	 USA = TEMP, OP FIXED CAN = OP FIXED MEX = PT - PT FIXED CEPT = PT - PT FIXED KOREA = PT - PT FIXED
3	SAME AS ABOVE	SAME AS ABOVE EXCEPT DELETE TEMPORARY USAGE	SAME AS ABOVE EXCEPT DELETE TEMP AND 6525 - 6725

PROPOSED C-BAND OPTIONS
IN FSS ALLOCATION BANDS

4

UPLINKS

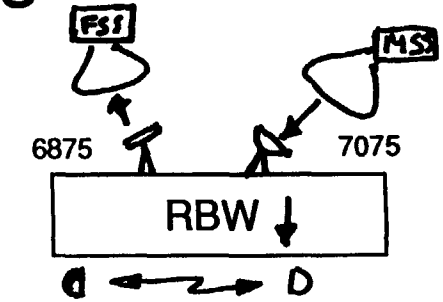


USA = TEMP, OP FIXED
CAN = OP FIXED
MEX = PT - PT FIXED
CEPT = PT - PT FIXED
KOREA = PT - PT FIXED

CENTRAL ISSUES

- DOWNLINK INTERFERENCE INTO AUX BCST/FIXED
  - Calculations show acceptable values
  - No FSS coordination
- UPLINK COORDINATION WITH INTELSAT AND DOMSATS
  - FSS into MSS
  - MSS into FSS

DOWNLINKS

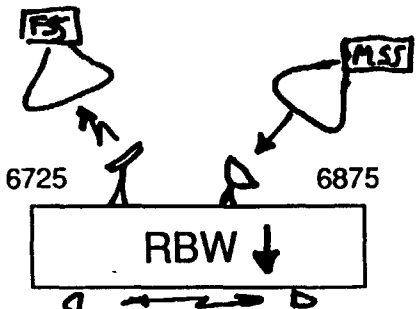


USA = AUX BCST
CAN = AUX BCST
MEX = PT - PT FIXED
CEPT = PT - PT FIXED
KOREA = PT - PT FIXED

5

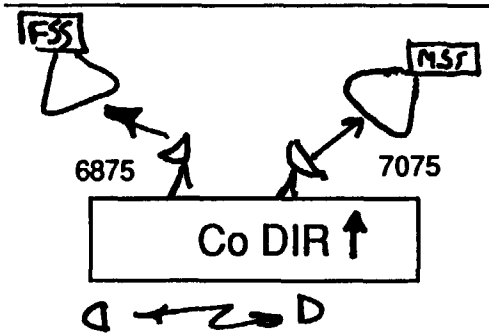
SAME AS ABOVE

- DOWNLINK INTERFERENCE INTO FIXED
  - Calculations show acceptable values
  - Unknown temporary usage
- UPLINK COORDINATION WITH INTELSAT AND DOMSATS
  - FSS into MSS
  - MSS into FSS



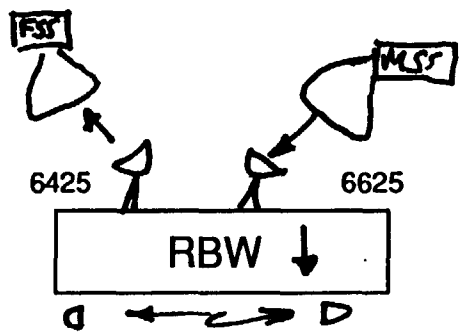
USA = OP FIXED
CAN = OP FIXED
MEX = PT - PT FIXED
CEPT = PT - PT FIXED
KOREA = PT - PT FIXED

6



USA = AUX BCST
CAN = AUX BCST
MEX = PT - PT FIXED
CEPT = PT - PT FIXED
KOREA = PT - PT FIXED

- DOWNLINK INTERFERENCE INTO FIXED
  - Calculations show acceptable values
  - Unknown temporary usage
- UPLINK COORDINATION WITH PLANNED ALLOTMENT BAND
  - FSS into MSS
  - MSS into FSS



USA = TEMP, OP FIXED
CAN = OP FIXED
MEX = PT - PT FIXED
CEPT = PT - PT FIXED
KOREA = PT - PT FIXED

Band Analysis (1)

- **Downlink**
  - Best choice: 200 MHz between 6875 and 7075 MHz
  - International usage is low
  - FSS sharing eased in the FSS allotment plan band
  - Aux-broadcast video signal least susceptible to interference
  - Reverse band operation
  - Other choices available between 6425-6875 MHz

Band Analysis (2)

- **Uplink**
  - Best Choice: 200 MHz between 4600-4800 MHz
  - 50 MHz identified for commercial usage by NTIA
  - FSS Allotment Plan (1988) allocated band for FSS downlink worldwide
  - Narrow beam uplinks can be coordinated with the lightly used government services
    - » Total U.S. assignments 1582, mostly in California, Nevada, Arizona
    - » Remainder distributed thinly over U.S.A.
  - No co-directional sharing with FSS required